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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/768,912	01/24/2001	Hiroji Kawai	09792909-4785	5026

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EXAMINER

MENEFEE, JAMES A

ART UNIT

PAPER NUMBER

2828

DATE MAILED: 06/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Applicati n No.

09/768,912

Applicant(s)

KAWAI, HIROJI

Examiner

James A. Menefee

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-- The MAILING DATE of this communication appears n the c ver sheet with the corresp ndence address --

**Peri d f r Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disp sition of Claims**

- 4) ☒ Claim(s) 9-12 and 25 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 9-12 and 25 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☒ Certified copies of the priority documents have been received in Application No. 09/316,044.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/22/2004 has been entered. Claims 9-12 are amended and claim 25 added. Claims 9-12 and 25 are pending.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 9-11 and 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Sassa et al. (previously cited US 5,862,167).

Regarding claim 9, Sassa discloses a semiconductor device comprising a single crystal substrate (1) made of a material other than nitride III-V semiconductors, said substrate extending between a first surface and a second surface opposite said first surface and having a hole extending through the substrate from the first surface to the second surface, a device (2,3,4,5,6)

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formed on one of said surfaces of said substrate (1) using III-V compound semiconductors, a layer (either 41, or, 41 can be taken as part of said device, then the layer is taken as 7) disposed on one of said surfaces of said substrate, and wherein said device (2-6 or 2-6 and 41) is formed between said layer (41 or 7) and said substrate (1) and said device is electrically connected to said layer, wherein an electrical connection to said device is created via the hole (by electrode 40) and contact with said layer (41 or 7) (see Fig. 4 and discussion thereof).

Regarding claim 10, the substrate (1) is a sapphire substrate.

Regarding claim 11, the device is a semiconductor laser using nitride III-V semiconductor materials.

Regarding claim 25, Sassa discloses a semiconductor device comprising a single crystal substrate (1) made of a material other than nitride III-V semiconductors, said substrate extending between a first surface and a second surface opposite said first surface and having a hole extending through the substrate from the first surface to the second surface, a device (4,5,6) formed on one of said surfaces of said substrate (1) using III-V compound semiconductors, a layer (3) disposed on one of said surfaces of said substrate, said device is electrically connected to said layer, wherein a surface of the layer (3, either surface) is at least as close to the substrate as a surface of the device facing the substrate (i.e. bottom surface of 4), wherein an electrical connection to said device is created via the hole and contact with said layer (3) (i.e. electrical connection is made to the device through 40 and 3) (see Fig. 4 and discussion thereof).

Note that Sassa is interpreted differently in rejecting claims 9 and 25.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sassa in view of Zhou (US 5,449,930). Sassa discloses the limitations of the claims as shown above, but does not disclose that the device is a FET. However, FETs are well known as being formed on substrates. The present invention concerns the device being formed on substrate where an electrical connection is made to the device through a via hole in the substrate. The type of device used is not critical. Similarly, see Zhou, which shows an invention related to a device formed on a substrate. In Zhou, the device is not critical, the interconnections through the substrate are the real invention, and Zhou teaches that the interconnections through the substrate may be used for a number of different devices formed on the substrate, for example FETs and semiconductor lasers. Since it is well known to form a FET on a substrate, and a FET should have some sort of electrical connection made thereto, then it would have been obvious to one skilled in the art to make use a FET as the device in place of the laser of Sassa by way of obvious engineering design choice, in light of Zhou's teaching that different semiconductor devices can be used on similar substrates.

***Response to Arguments***

Applicant's arguments filed 3/22/2004 have been considered but are not persuasive.

Regarding claim 9, Applicant argues that Sassa does not disclose the device being between the layer and the substrate because the layer 3 is between the device and the substrate. However, the device of Sassa can additionally be interpreted as including this layer 3 as in the above rejections, and instead the layer that forms the electrical contact layer can instead be interpreted as 41 or 7.

By interpreting Sassa in this way, it seems clear that Sassa is nearly identical to the present invention. See Fig. 14 of the present invention, where there is a substrate 51 having a hole, a device 52 through 59, and a layer 60, the device being between the substrate and the layer, and electrical connection being made via the hole and contact with the layer (i.e. between 61 and 60). This is the only interpretation of Fig. 14 where the device will be between the layer and the substrate, so 60 may be interpreted as the layer, and in the same way Sassa's 41 or 7 may be interpreted as the layer.

Regarding claim 12, applicant makes the same arguments as regarding claim 9, rebutted above. Applicant further argues that there is no suggestion that the device of Sassa may be a FET. The examiner stands by the previous assertion, in that the applicant's invention is the use of the hole in a non III-V nitride substrate. The particular device used is really incidental to the invention so long as it is a III-V semiconductor device. See specification col. 6 line 25 – col. 7 line 18. (“It is therefore an object of the invention to provide a semiconductor device...**by the use of a thinned substrate and/or a via hole in the substrate** even when a device using nitride III-V compound semiconductors is made on a single-crystal substrate”) (“Another object of the invention is to provide a semiconductor device...**by the use of a via hole in its substrate** when the light emitting element is made by using nitride III-V compound semiconductors is made on a

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non-conductive single-crystal substrate"). Still, a reference is added above, rendering the arguments moot.

### *Conclusion*

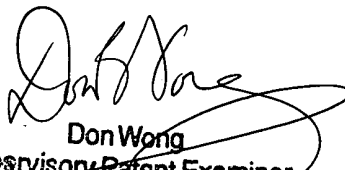
Any inquiry concerning this communication or earlier communications from the examiner should be directed to James A. Menefee whose telephone number is (571) 272-1944. The examiner can normally be reached on M-F 8:30-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on (571) 272-1834. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JM

May 20, 2004

  
Don Wong  
Supervisory Patent Examiner  
Technology Center 2800